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pears to have developed independently, but to have been influenced by one or more of the others.

Experience shows the advisability of conducting archæological work in co-operation with students of living tribes. A study of the Indian living in the country under exploration usually throws light on archæological finds made there, while an understanding of the antiquities of a region helps the study of the Indian living there. The continuity of the historical problem is met by a continuity of method.

In selecting fields of operation it seems best always to continue explorations in an area so far distant from one already examined that new conditions will be encountered. This will make it probable that new facts will be discovered, if not a new culture area. At the same time the new field should be so near to the old that no culture area may intervene. Thus the culture boundaries may be determined, and new areas discovered. Exploration carried on by this continuous method makes the experience already gained of service in a new and adjacent field, while discoveries in such a new field may lead to a better understanding of those previously examined.

It remains to determine the northern, eastern, and southern limits of the general plateau culture, how far it may be subdivided into local areas, and the inter-relation of these with each other and with outside areas.

Specimens are few from the whole region lying between the mouth of the Columbia, the Santa Barbara Islands, the Cliff and Pueblo region of Arizona and New Mexico, and the Mound region of the Mississippi Valley. Literature on the archæology is scanty. That whole region north to the Arctic and all that of the plains towards the east and south throughout the plateaus and Nevada remain to be explored.

THE ERUPTION OF VESUVIUS.

The activity of Vesuvius since last February culminated early in April in an outburst that will rank among the historic eruptions. An account of the occurrence in the *BULLETIN* will be deferred until it can be treated more accurately and adequately than at present; but some facts of interest from the press reports may be given.

April 5.—The volcano became strongly active, and large masses

of rock were hurled as far as the lower station of the funicular railway.

April 6.—The lava-flow arrived within three or four miles of Bosco-Tre-Case, on the southern slope of the mountain; another stream threatened Ottajano, on the north-eastern slope. A new crater was formed.

April 7.—Bosco-Tre-Case, between the volcano and Pompeii, was buried under lava, which swept down in a torrent from the new Ciaramella crater. There were two streams from this crater, one of which, 600 feet wide, moved towards the centre of the town, which had been abandoned by its inhabitants. The town was completely surrounded by lava at 6 A. M. The south side of the cone of Vesuvius collapsed. Another new crater opened on the north side of the cone in the Atrio del Cavallo, and ejected large quantities of lava and stones. The old crater, also, was in violent eruption. Gray volcanic ash fell in the streets of Naples, and explosions were incessant.

April 8.—Dr. Matteucci, the director of the Royal Vesuvian Observatory, reported:

The eruption of Vesuvius has assumed extraordinary proportions. Yesterday and last night the activity of the crater was terrific and ever-increasing. The neighborhood of the Observatory is completely covered with lava. Incandescent rocks are thrown by the thousand to a height of 2,400 and 3,000 feet, and fall back, forming a large cone.

Another stream of lava has appeared from a fissure, the position of which is not well defined. The noise of the explosions and the rocks striking together is deafening. The ground is shaken by strong and continuous seismic movements. The instruments threaten to break. It will probably be necessary to abandon the Observatory, which is very much exposed to electric shocks. The telegraph is interrupted.

A telegram from Naples announced that Ottajano, Poggio Marino, and Somma had been abandoned. The lava was flowing seven feet deep through the streets of Ottajano. A telegram from Montenegro said that a shower of black dust, like iron filings, supposed to come from Vesuvius, fell throughout that country, covering the surface to a depth of a millimeter with an iron-gray deposit.

April 9.—The lava-stream that had been moving towards *Torredell' Annunziata* stopped flowing, and the eruptions were less violent. Clouds of volcanic ash still filled the air, making the day so dark that navigation was dangerous in the Bay of Naples. The seismic instruments on previous nights recorded several earthquake shocks. The dynamic action of the volcano appeared to be considerably diminished. Professor Matteucci reported at 6.30 P. M. from the Observatory:

The explosive activity of Vesuvius, which was very great yesterday and was accompanied by very powerful electric discharges, diminished yesterday evening. During the night the expulsion of rocks ceased, but the emission of sand increased, completely enveloping me and forming a bed more than ten centimeters deep, which carried desolation into this elevated region. Masses of sand gliding along the

earth created complete darkness until 7 o'clock.* Several blocks of stone broke windows of the Observatory. Last night the earthquake shocks were stronger and more frequent than yesterday, and displaced the seismic apparatus. Yesterday afternoon and this morning torrents of sand fell. While I am telegraphing several balls of fire rise with loud rumbling from the enlarged craters and the new elevated crevasses.

April 10.—Professor Matteucci reported from the Observatory:

Last night was calm except for a few explosions of considerable force from time to time. At 4 o'clock this morning the explosions became more violent. The seismic instruments of the Observatory record strong disturbances in the interior of the mountain.

April 11.—Vesuvius became comparatively quiet.

CHANGES ON THE EARTH'S SURFACE.

Studies of the surface of the earth have never been so numerous or so varied as at present. There are still many gaps unfilled, however, and Richard Tronnier, head-master at Hamm, Westphalia, has called attention to some of them (*Pet. Mitteil.*, No. 2, 1906). While the atmosphere and the hydrosphere, on account of their circulation and large practical interest, have had the lion's share of attention, there are phases of the phenomena of the earth's crust which are only beginning to receive due investigation. Periodicals devoted to seismology, for example, are of recent establishment. In addition to the study of tectonic changes, to which great attention has been given, investigators have been chiefly concerned in such modifications of the earth's surface as are made by the changing boundaries between land and sea, the growth of deltas, the spreading boundaries of cities, etc.

Tronnier believes it is highly important that systematic efforts should be set on foot to collect in a systematic manner the facts concerning the changes of the earth's surface constantly going on before our eyes, and he thinks that these data, scientifically collected and arranged, would form an important document in the history of our planet. He presents a considerable number of occurrences reported last year as illustrations of the work which, he suggests, should be done. A number of them may be referred to:

The steamer *City of Panama* reported in January that in $16^{\circ} 15' N.$ and $100^{\circ} 29' W.$ she had passed through an area, a mile wide, that was so thickly covered with trees, plants and the bodies of animals that she could hardly force her way. It has been suggested that this phenomenon may have been caused by the destruction of one or more of the islands of the uninhabited Revilla Gigedo group.

The island Nushima was seen by the natives of some of the Bonin Islands to rise above the surface of the Pacific on Nov. 14, 1904. It finally attained a height of 480 feet. It was found in July, 1905, that the island had gradually become reduced in size until its highest point was only 10 feet above the sea and its periphery had greatly decreased. It was thought that in a few weeks more it would entirely disappear.

* The language is dark, like the sand.